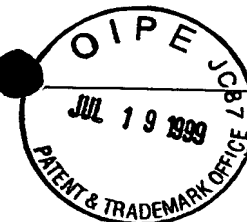SEQUENCE LISTING

<110> Immulogic Pharmaceutical Corp.

<120> T CELL EPITOPES OF RYEGRASS POLLEN ALLERGEN

<130> IMI-040CP3

<140> 08/737,904
<141> 1996-11-20

<150> 08/106,016
<151> 1993-08-13

<160> 60

<170> PatentIn Ver. 2.0

<210> 1
<211> 1229
<212> DNA
<213> Lolium perenne

<220>
<221> CDS
<222> (40)..(942)

<400> 1

```
cgctatccct ccctcgtaca aacaaacgca agagcagca atg gcc gtc cag aag      54
                                            Met Ala Val Gln Lys
                                             1               5

tac acg gtg gct cta ttc ctc gcc gtg gcc ctc gtg gcg ggc ccg gcc    102
Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu Val Ala Gly Pro Ala
                10                  15                  20

gcc tcc tac gcc gct gac gcc ggc tac acc ccc gca gcc gcg gcc acc    150
Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro Ala Ala Ala Ala Thr
            25                  30                  35

ccg gct act cct gct gcc acc ccg gct gcg gct gga ggg aag gcg acg    198
Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala Gly Gly Lys Ala Thr
        40                  45                  50

acc gac gag cag aag ctg ctg gag gac gtc aac gct ggc ttc aag gca    246
Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala
    55                  60                  65

gcc gtg gcc gcc gct gcc aac gcc cct ccg gcg gac aag ttc aag atc    294
Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile
70                  75                  80                  85

ttc gag gcc gcc ttc tcc gag tcc tcc aag ggc ctc ctc gcc acc tcc    342
Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser
                90                  95                 100

gcc gcc aag gca ccc ggc ctc atc ccc aag ctc gac acc gcc tac gac    390
```

```
Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp
            105               110              115

gtc gcc tac aag gcc gcc gag ggc gcc acc ccc gag gcc aag tac gac   438
Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro Glu Ala Lys Tyr Asp
            120               125              130

gcc ttc gtc act gcc ctc acc gaa gcg ctc cgc gtc atc gcc ggc gcc   486
Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala
            135               140              145

ctc gag gtc cac gcc gtc aag ccc gcc acc gag gag gtc cct gct gct   534
Leu Glu Val His Ala Val Lys Pro Ala Thr Glu Glu Val Pro Ala Ala
150               155               160              165

aag atc ccc acc ggt gag ctg cag atc gtt gac aag atc gat gct gcc   582
Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp Lys Ile Asp Ala Ala
                  170               175              180

ttc aag atc gca gcc acc gcc gcc aac gcc gcc ccc acc aac gat aag   630
Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys
                185               190              195

ttc acc gtc ttc gag agt gcc ttc aac aag gcc ctc aat gag tgc acg   678
Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala Leu Asn Glu Cys Thr
            200               205               210

ggc ggc gcc tat gag acc tac aag ttc atc ccc tcc ctc gag gcc gcg   726
Gly Gly Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala
            215               220               225

gtc aag cag gcc tac gcc gcc acc gtc gcc gcc gcg ccc gag gtc aag   774
Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala Pro Glu Val Lys
230               235               240               245

tac gcc gtc ttt gag gcc gcg ctg acc aag gcc atc acc gcc atg acc   822
Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Thr
                  250               255               260

cag gca cag aag gcc ggc aaa ccc gct gcc gcc gct gcc aca ggc gcc   870
Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala Ala Ala Ala Thr Gly Ala
                265               270               275

gca acc gtt gcc acc ggc gcc gca acc gcc gcc gcc ggt gct gcc acc   918
Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala Ala Thr
            280               285               290

gcc gct gct ggt ggc tac aaa gcc tgatcagctt gctaatatac tactgaacgt   972
Ala Ala Ala Gly Gly Tyr Lys Ala
295               300


atgtatgtgc atgatccggg cggcgagtgg ttttgttgat aattaatctt cgttttcgtt 1032

tcatgcagcc gcgatcgaga gggcttgcat gcttgtaata attcaatatt tttcatttct 1092

ttttgaatct gtaaatcccc atgacaagta gtgggatcaa gtcggcatgt atcaccgttg 1152
```

48

atgcgagttt aacgatgggg agtttatcaa agaatttatt attaaaaaaa aaaaaaaaaa 1212

aaaaaaaaaa aaaaaaa   1229

<210> 2
<211> 301
<212> PRT
<213> Lolium perenne

<400> 2
Met Ala Val Gln Lys Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Leu
 1   5   10   15

Val Ala Gly Pro Ala Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Thr Pro
            20   25   30

Ala Ala Ala Ala Thr Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala
        35   40   45

Gly Gly Lys Ala Thr Thr Asp Glu Gln Lys Leu Leu Glu Asp Val Asn
    50   55   60

Ala Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala
65   70   75   80

Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly
            85   90   95

Leu Leu Ala Thr Ser Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys Leu
            100   105   110

Asp Thr Ala Tyr Asp Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro
        115   120   125

Glu Ala Lys Tyr Asp Ala Phe Val Thr Ala Leu Thr Glu Ala Leu Arg
    130   135   140

Val Ile Ala Gly Ala Leu Glu Val His Ala Val Lys Pro Ala Thr Glu
145   150   155   160

Glu Val Pro Ala Ala Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp
            165   170   175

Lys Ile Asp Ala Ala Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala Ala
            180   185   190

Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala
        195   200   205

Leu Asn Glu Cys Thr Gly Gly Ala Tyr Glu Thr Tyr Lys Phe Ile Pro
    210   215   220

Ser Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala
225   230   235   240

Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala

49

Ile Thr Ala Met Thr Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala Ala
            260   265   270

Ala Ala Thr Gly Ala Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala
            275   280   285

Ala Gly Ala Ala Thr Ala Ala Ala Gly Gly Tyr Lys Ala
        290   295   300

<210> 3
<211> 20
<212> PRT
<213> Lolium perenne

<400> 3
Ala Asp Ala Gly Tyr Thr Pro Ala Ala Ala Ala Thr Pro Ala Thr Pro
    1   5   10   15

Ala Ala Thr Pro
            20

<210> 4
<211> 20
<212> PRT
<213> Lolium perenne

<400> 4
Ala Thr Pro Ala Thr Pro Ala Ala Thr Pro Ala Ala Ala Gly Gly Lys
    1   5   10   15

Ala Thr Thr Asp
            20

<210> 5
<211> 20
<212> PRT
<213> Lolium perenne

<400> 5
Ala Ala Ala Gly Gly Lys Ala Thr Thr Asp Glu Gln Lys Leu Leu Glu
    1   5   10   15

Asp Val Asn Ala
            20

<210> 6
<211> 20
<212> PRT
<213> Lolium perenne

<400> 6

```
Glu Gln Lys Leu Leu Glu Asp Val Asn Ala Gly Phe Lys Ala Ala Val
 1               5                   10                  15

Ala Ala Ala Ala
            20


<210> 7
<211> 16
<212> PRT
<213> Lolium perenne

<400> 7
Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Asn Ala Pro Pro Ala Asp
 1               5                   10                  15


<210> 8
<211> 20
<212> PRT
<213> Lolium perenne

<400> 8
Asn Ala Pro Pro Ala Asp Lys Phe Lys Ile Phe Glu Ala Ala Phe Ser
 1               5                   10                  15

Glu Ser Ser Lys
            20


<210> 9
<211> 20
<212> PRT
<213> Lolium perenne

<400> 9
Phe Glu Ala Ala Phe Ser Glu Ser Ser Lys Gly Leu Leu Ala Thr Ser
 1               5                   10                  15

Ala Ala Lys Ala
            20


<210> 10
<211> 20
<212> PRT
<213> Lolium perenne

<400> 10
Gly Leu Leu Ala Thr Ser Ala Ala Lys Ala Pro Gly Leu Ile Pro Lys
 1               5                   10                  15

Leu Asp Thr Ala
            20


<210> 11
```

51

<211> 20
<212> PRT
<213> Lolium perenne

<400> 11
Pro Gly Leu Ile Pro Lys Leu Asp Thr Ala Tyr Asp Val Ala Tyr Lys
 1   5   10   15

Ala Ala Glu Gly
            20

<210> 12
<211> 20
<212> PRT
<213> Lolium perenne

<400> 12
Tyr Asp Val Ala Tyr Lys Ala Ala Glu Gly Ala Thr Pro Glu Ala Lys
 1   5   10   15

Tyr Asp Ala Phe
            20

<210> 13
<211> 20
<212> PRT
<213> Lolium perenne

<400> 13
Ala Thr Pro Glu Ala Lys Tyr Asp Ala Phe Val Thr Ala Leu Thr Glu
 1   5   10   15

Ala Leu Arg Val
            20

<210> 14
<211> 20
<212> PRT
<213> Lolium perenne

<400> 14
Val Thr Ala Leu Thr Glu Ala Leu Arg Val Ile Ala Gly Ala Leu Glu
 1   5   10   15

Val His Ala Val
            20

<210> 15
<211> 20
<212> PRT
<213> Lolium perenne

<400> 15

Ile Ala Gly Ala Leu Glu Val His Ala Val Lys Pro Ala Thr Glu Glu
 1   5   10   15

Val Pro Ala Ala
                 20

<210> 16
<211> 20
<212> PRT
<213> Lolium perenne

<400> 16
Lys Pro Ala Thr Glu Glu Val Pro Ala Ala Lys Ile Pro Thr Gly Glu
 1   5   10   15

Leu Gln Ile Val
                 20

<210> 17
<211> 20
<212> PRT
<213> Lolium perenne

<400> 17
Lys Ile Pro Thr Gly Glu Leu Gln Ile Val Asp Lys Ile Asp Ala Ala
 1   5   10   15

Phe Lys Ile Ala
                 20

<210> 18
<211> 20
<212> PRT
<213> Lolium perenne

<400> 18
Asp Lys Ile Asp Ala Ala Phe Lys Ile Ala Ala Thr Ala Ala Asn Ala
 1   5   10   15

Ala Pro Thr Asn
                 20

<210> 19
<211> 20
<212> PRT
<213> Lolium perenne

<400> 19
Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe
 1   5   10   15

Glu Ser Ala Phe
                 20

53

<210> 20
<211> 20
<212> PRT
<213> Lolium perenne

<400> 20
Asp Lys Phe Thr Val Phe Glu Ser Ala Phe Asn Lys Ala Leu Asn Glu
 1   5   10   15

Cys Thr Gly Gly
             20

<210> 21
<211> 20
<212> PRT
<213> Lolium perenne

<400> 21
Asn Lys Ala Leu Asn Glu Cys Thr Gly Gly Ala Tyr Glu Thr Tyr Lys
 1   5   10   15

Phe Ile Pro Ser
             20

<210> 22
<211> 20
<212> PRT
<213> Lolium perenne

<400> 22
Ala Tyr Glu Thr Tyr Lys Phe Ile Pro Ser Leu Glu Ala Ala Val Lys
 1   5   10   15

Gln Ala Tyr Ala
             20

<210> 23
<211> 20
<212> PRT
<213> Lolium perenne

<400> 23
Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ala Ala
 1   5   10   15

Pro Glu Val Lys
             20

<210> 24
<211> 20
<212> PRT

54

<213> Lolium perenne

<400> 24
Ala Thr Val Ala Ala Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Ala
1   5   10   15

Ala Leu Thr Lys
            20

<210> 25
<211> 20
<212> PRT
<213> Lolium perenne

<400> 25
Tyr Ala Val Phe Glu Ala Ala Leu Thr Lys Ala Ile Thr Ala Met Thr
1   5   10   15

Gln Ala Gln Lys
            20

<210> 26
<211> 20
<212> PRT
<213> Lolium perenne

<400> 26
Ala Ile Thr Ala Met Thr Gln Ala Gln Lys Ala Gly Lys Pro Ala Ala
1   5   10   15

Ala Ala Ala Thr
            20

<210> 27
<211> 20
<212> PRT
<213> Lolium perenne

<400> 27
Ala Gly Lys Pro Ala Ala Ala Ala Ala Thr Gly Ala Ala Thr Val Ala
1   5   10   15

Thr Gly Ala Ala
            20

<210> 28
<211> 20
<212> PRT
<213> Lolium perenne

<400> 28
Gly Ala Ala Thr Val Ala Thr Gly Ala Ala Thr Ala Ala Ala Gly Ala
1   5   10   15

Ala Thr Ala Ala
                20

<210> 29
<211> 16
<212> PRT
<213> Lolium perenne

<400> 29
Thr Ala Ala Ala Gly Ala Ala Thr Ala Ala Ala Gly Gly Tyr Lys Ala
  1   5   10   15

<210> 30
<211> 20
<212> PRT
<213> Lolium perenne

<400> 30
Ile Ala Lys Val Pro Pro Gly Pro Asn Ile Thr Ala Glu Tyr Gly Asp
  1   5   10   15

Lys Trp Leu Asp
                20

<210> 31
<211> 20
<212> PRT
<213> Lolium perenne

<400> 31
Ile Ala Lys Val Xaa Pro Gly Xaa Asn Ile Thr Ala Glu Tyr Gly Asp
  1   5   10   15

Lys Trp Leu Asp
                20

<210> 32
<211> 20
<212> PRT
<213> Lolium perenne

<400> 32
Thr Ala Glu Tyr Gly Asp Lys Trp Leu Asp Ala Lys Ser Thr Trp Tyr
  1   5   10   15

Gly Lys Pro Thr
                20

<210> 33
<211> 20
<212> PRT

<213> Lolium perenne

<400> 33
Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asn Val
 1   5   10   15

Asp Lys Ala Pro
            20

<210> 34
<211> 20
<212> PRT
<213> Lolium perenne

<400> 34
Gly Ala Gly Pro Lys Asp Asn Gly Gly Ala Cys Gly Tyr Lys Asp Val
 1   5   10   15

Asp Lys Ala Pro
            20

<210> 35
<211> 20
<212> PRT
<213> Lolium perenne

<400> 35
Cys Gly Tyr Lys Asp Val Asp Lys Ala Pro Phe Asn Gly Met Thr Gly
 1   5   10   15

Cys Gly Asn Thr
            20

<210> 36
<211> 22
<212> PRT
<213> Lolium perenne

<400> 36
Cys Gly Phe Asn Gly Met Thr Gly Cys Gly Asn Thr Pro Ile Phe Lys
 1   5   10   15

Asp Gly Arg Gly Cys Gly
            20

<210> 37
<211> 20
<212> PRT
<213> Lolium perenne

<400> 37
Pro Ile Phe Lys Asp Gly Arg Gly Cys Gly Ser Cys Phe Glu Ile Lys
 1   5   10   15

57

Cys Thr Lys Pro
              20

<210> 38
<211> 20
<212> PRT
<213> Lolium perenne

<400> 38
Ser Cys Phe Glu Ile Lys Cys Thr Lys Pro Glu Ser Cys Ser Gly Glu
  1   5   10   15

Ala Val Thr Val
              20

<210> 39
<211> 20
<212> PRT
<213> Lolium perenne

<400> 39
Glu Ser Cys Ser Gly Glu Ala Val Thr Val Thr Ile Thr Asp Asp Asn
  1   5   10   15

Glu Glu Pro Ile
              20

<210> 40
<211> 20
<212> PRT
<213> Lolium perenne

<400> 40
Thr Ile Thr Asp Asp Asn Glu Glu Pro Ile Ala Pro Tyr His Phe Asp
  1   5   10   15

Leu Ser Gly His
              20

<210> 41
<211> 20
<212> PRT
<213> Lolium perenne

<400> 41
Ala Pro Tyr His Phe Asp Leu Ser Gly His Ala Phe Gly Ser Met Ala
  1   5   10   15

Asp Asp Gly Glu
              20

<210> 42
<211> 20
<212> PRT
<213> Lolium perenne

<400> 42
Ala Phe Gly Ser Met Ala Asp Asp Gly Glu Glu Gln Lys Leu Arg Ser
 1   5   10   15

Ala Gly Glu Leu
            20

<210> 43
<211> 20
<212> PRT
<213> Lolium perenne

<400> 43
Glu Gln Lys Leu Arg Ser Ala Gly Glu Leu Glu Leu Gln Phe Arg Arg
 1   5   10   15

Val Lys Cys Lys
            20

<210> 44
<211> 20
<212> PRT
<213> Lolium perenne

<400> 44
Glu Leu Gln Phe Arg Arg Val Lys Cys Lys Tyr Pro Asp Asp Thr Lys
 1   5   10   15

Pro Thr Phe His
            20

<210> 45
<211> 20
<212> PRT
<213> Lolium perenne

<400> 45
Tyr Pro Asp Asp Thr Lys Pro Thr Phe His Val Glu Lys Ala Ser Asn
 1   5   10   15

Pro Asn Tyr Leu
            20

<210> 46
<211> 20
<212> PRT
<213> Lolium perenne

<400> 46
Val Glu Lys Ala Ser Asn Pro Asn Tyr Leu Ala Ile Leu Val Lys Tyr
1   5   10   15

Val Asp Gly Asp
                20

<210> 47
<211> 20
<212> PRT
<213> Lolium perenne

<400> 47
Val Glu Lys Gly Ser Asn Pro Asn Tyr Leu Ala Ile Leu Val Lys Tyr
1   5   10   15

Val Asp Gly Asp
                20

<210> 48
<211> 20
<212> PRT
<213> Lolium perenne

<400> 48
Ala Ile Leu Val Lys Tyr Val Asp Gly Asp Gly Asp Val Val Ala Val
1   5   10   15

Asp Ile Lys Glu
                20

<210> 49
<211> 20
<212> PRT
<213> Lolium perenne

<400> 49
Gly Asp Val Val Ala Val Asp Ile Lys Glu Lys Gly Lys Asp Lys Trp
1   5   10   15

Ile Glu Leu Lys
                20

<210> 50
<211> 20
<212> PRT
<213> Lolium perenne

<400> 50
Lys Gly Lys Asp Lys Trp Ile Glu Leu Lys Glu Ser Trp Gly Ala Val
1   5   10   15

Trp Arg Ile Asp

<210> 51
<211> 20
<212> PRT
<213> Lolium perenne

<400> 51
Thr Pro Asp Lys Leu Thr Gly Pro Phe Thr Val Arg Tyr Thr Thr Glu
1   5   10   15

Gly Gly Thr Lys
            20

<210> 52
<211> 20
<212> PRT
<213> Lolium perenne

<400> 52
Val Arg Tyr Thr Thr Glu Gly Gly Thr Lys Ser Glu Val Glu Asp Val
1   5   10   15

Ile Pro Glu Gly
            20

<210> 53
<211> 20
<212> PRT
<213> Lolium perenne

<400> 53
Ser Glu Val Glu Asp Val Ile Pro Glu Gly Trp Lys Ala Asp Thr Ser
1   5   10   15

Tyr Ser Ala Lys
            20

<210> 54
<211> 33
<212> PRT
<213> Lolium perenne

<400> 54
Ala Asp Ala Gly Tyr Thr Xaa Ala Ala Ala Ala Thr Xaa Ala Thr Xaa
1   5   10   15

Ala Ala Thr Xaa Ala Ala Ala Gly Gly Lys Ala Thr Thr Asp Glu Gln
            20   25   30

Lys

<210> 55
<211> 20
<212> PRT
<213> Lolium perenne

<400> 55
Ala Lys Ser Thr Trp Tyr Gly Lys Pro Thr Gly Ala Gly Pro Lys Asp
1   5   10   15

Asn Gly Gly Ala
            20

<210> 56
<211> 20
<212> PRT
<213> Lolium perenne

<400> 56
Glu Ser Trp Gly Ala Val Trp Arg Ile Asp Thr Pro Asp Lys Leu Thr
1   5   10   15

Gly Pro Phe Thr
            20

<210> 57
<211> 1181
<212> DNA
<213> Lolium perenne

<220>
<221> CDS
<222> (53)..(961)

<220>
<221> mat_peptide
<222> (125)

<400> 57
gaattcgagg atccgggtac catggctccg acaaaccaac gcaagagcag ca atg gca 58
                                                           Met Ala

gtg cag cag tac acg gtg gcg ctg ttc ctg gcc gtg gcc tcg tgt cgg   106
Val Gln Gln Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Ser Cys Arg
        -20   -15   -10

gcc cgc gcc tcc tac gcc gcc gac gcc ggc tac gcc ccc gcc act ccc   154
Ala Arg Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Ala Pro Ala Thr Pro
    -5   -1   1   5   10

gcc acc ccg gct acc ccc gcg gcc cca ggc gca gcg gtg cca gca ggg   202
Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro Ala Gly
                15   20   25

aag gcg gcg acc gag gag cag aag ctg atc gag aag atc aac gcc ggc   250

62

```
    Lys Ala Ala Thr Glu Glu Gln Lys Leu Ile Glu Lys Ile Asn Ala Gly
                30              35                  40

    ttc aag gcc gcc gtg gcg gcc gcc gcg ggc gtc ccg cca ggc gac aag   298
    Phe Lys Ala Ala Val Ala Ala Ala Ala Gly Val Pro Pro Gly Asp Lys
                45              50                  55

    tac aag acg ttc gtc gaa acc ttc ggc aag gcc tcc aac aag gcc ttc   346
    Tyr Lys Thr Phe Val Glu Thr Phe Gly Lys Ala Ser Asn Lys Ala Phe
                60              65                  70

    ctg ggg gac ctc ccg acc aac tac gcc gat gtc aac tcc agg gcc cag   394
    Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg Ala Gln
        75              80                  85                  90

    ctc acc tcg aag ctc gac gcc gcc tac aag ctc gcc tac gac gcc gcc   442
    Leu Thr Ser Lys Leu Asp Ala Ala Tyr Lys Leu Ala Tyr Asp Ala Ala
                    95              100                 105

    cag ggc gcc acc ccc gag gcc aag tac gac gcc tac gtc gcc acc ctc   490
    Gln Gly Ala Thr Pro Glu Ala Lys Tyr Asp Ala Tyr Val Ala Thr Leu
                    110             115                 120

    agc gag gcg ctc cgc atc atc gcc ggc acc ctc gag gtc cac gcc gtc   538
    Ser Glu Ala Leu Arg Ile Ile Ala Gly Thr Leu Glu Val His Ala Val
                125             130                 135

    aag ccc gct gcc gag gag gtc aag cct atc ccc gcc gga gag ctg cag   586
    Lys Pro Ala Ala Glu Glu Val Lys Pro Ile Pro Ala Gly Glu Leu Gln
                140             145                 150

    atc gtc gac aag att gac gtc gcc ttc aga act gcc gcc acc gcc gcc   634
    Ile Val Asp Lys Ile Asp Val Ala Phe Arg Thr Ala Ala Thr Ala Ala
    155                 160                 165                 170

    aac gcc gcc ccc acc aac gac aag ttc acc gta ttc gag acc acc ttt   682
    Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Thr Thr Phe
                    175                 180                 185

    aac aag gcc atc aag gag agc acg ggc ggc acc tac gag agc tac aag   730
    Asn Lys Ala Ile Lys Glu Ser Thr Gly Gly Thr Tyr Glu Ser Tyr Lys
                    190                 195                 200

    ttc att ccc acc ctt gag gcc gcc gtt aag cag gcc tac gcc gcc acc   778
    Phe Ile Pro Thr Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr
                    205                 210                 215

    gtc gca tcc gcg ccg gag gtc aag tac gcc gtc ttt gag acc gcg ctg   826
    Val Ala Ser Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Thr Ala Leu
        220                 225                 230

    aaa aag gcg gtc acc gcc atg tcc gag gcc cag aag gaa gcc aag ccc   874
    Lys Lys Ala Val Thr Ala Met Ser Glu Ala Gln Lys Glu Ala Lys Pro
    235                 240                 245                 250

    gcc acc gcc acc ccg acc ccc acc gca act gcc gcg gcc gcg gtg gcc   922
    Ala Thr Ala Thr Pro Thr Pro Thr Ala Thr Ala Ala Ala Ala Val Ala
```

```
acc aac gcc gcc ccc gtc gct gct ggt ggc tac aaa atc tgatcaactc    971
Thr Asn Ala Ala Pro Val Ala Ala Gly Gly Tyr Lys Ile
            270                 275

gctagcaata tacacatcca tcatgcacat atagagctgt gtatgtatgt gcatgcatgc 1031

cgtggcgccg cgcaagtttg ctcataatta attcttggtt ttcgttgctt gcatccacga 1091

gcgaccgagc ccgtggatag tcgcatgtgt atgtaatttt ttctgagaaa tgtgtatatg 1151

taatatataa ttgagtacta aaaaaaaaaa                                  1181
```

<210> 58
<211> 279
<212> PRT
<213> Lolium perenne

<400> 58

```
Ala Asp Ala Gly Tyr Ala Pro Ala Thr Pro Ala Thr Pro Ala Thr Pro
 1               5                10                15

Ala Ala Pro Gly Ala Ala Val Pro Ala Gly Lys Ala Ala Thr Glu Glu
            20                25                30

Gln Lys Leu Ile Glu Lys Ile Asn Ala Gly Phe Lys Ala Ala Val Ala
            35                40                45

Ala Ala Ala Gly Val Pro Pro Gly Asp Lys Tyr Lys Thr Phe Val Glu
            50                55                60

Thr Phe Gly Lys Ala Ser Asn Lys Ala Phe Leu Gly Asp Leu Pro Thr
 65                70                75                80

Asn Tyr Ala Asp Val Asn Ser Arg Ala Gln Leu Thr Ser Lys Leu Asp
                85                90                95

Ala Ala Tyr Lys Leu Ala Tyr Asp Ala Ala Gln Gly Ala Thr Pro Glu
            100               105               110

Ala Lys Tyr Asp Ala Tyr Val Ala Thr Leu Ser Glu Ala Leu Arg Ile
            115               120               125

Ile Ala Gly Thr Leu Glu Val His Ala Val Lys Pro Ala Ala Glu Glu
            130               135               140

Val Lys Pro Ile Pro Ala Gly Glu Leu Gln Ile Val Asp Lys Ile Asp
145               150               155               160

Val Ala Phe Arg Thr Ala Ala Thr Ala Ala Asn Ala Ala Pro Thr Asn
                165               170               175
```

64

Asp Lys Phe Thr Val Phe Glu Thr Thr Phe Asn Lys Ala Ile Lys Glu
            180   185   190

Ser Thr Gly Gly Thr Tyr Glu Ser Tyr Lys Phe Ile Pro Thr Leu Glu
            195   200   205

Ala Ala Val Lys Gln Ala Tyr Ala Ala Thr Val Ala Ser Ala Pro Glu
            210   215   220

Val Lys Tyr Ala Val Phe Glu Thr Ala Leu Lys Lys Ala Val Thr Ala
225   230   235   240

Met Ser Glu Ala Gln Lys Glu Ala Lys Pro Ala Thr Ala Thr Pro Thr
            245   250   255

Pro Thr Ala Thr Ala Ala Ala Ala Val Ala Thr Asn Ala Ala Pro Val
            260   265   270

Ala Ala Gly Gly Tyr Lys Ile
            275

<210> 59
<211> 20
<212> PRT
<213> Lolium perenne

<400> 59
Ala Asp Ala Gly Tyr Thr Xaa Ala Ala Ala Ala Thr Xaa Ala Thr Xaa
    1   5   10   15

Ala Ala Thr Xaa
            20

<210> 60
<211> 20
<212> PRT
<213> Lolium perenne

<400> 60
Ala Thr Xaa Ala Thr Xaa Ala Ala Thr Xaa Ala Ala Ala Gly Gly Lys
    1   5   10   15

Ala Thr Thr Asp
            20

<210> 61
<211> 303
<212> PRT
<213> Lolium perenne

<400> 61
Met Ala Val Gln Gln Tyr Thr Val Ala Leu Phe Leu Ala Val Ala Ser
                -20   -15   -10

65

Cys Arg Ala Arg Ala Ser Tyr Ala Ala Asp Ala Gly Tyr Ala Pro Ala
              -5   -1 1   5

Thr Pro Ala Thr Pro Ala Thr Pro Ala Ala Pro Gly Ala Ala Val Pro
         10   15   20

Ala Gly Lys Ala Ala Thr Glu Glu Gln Lys Leu Ile Glu Lys Ile Asn
25   30   35   40

Ala Gly Phe Lys Ala Ala Val Ala Ala Ala Ala Gly Val Pro Pro Gly
             45   50   55

Asp Lys Tyr Lys Thr Phe Val Glu Thr Phe Gly Lys Ala Ser Asn Lys
             60   65   70

Ala Phe Leu Gly Asp Leu Pro Thr Asn Tyr Ala Asp Val Asn Ser Arg
             75   80   85

Ala Gln Leu Thr Ser Lys Leu Asp Ala Ala Tyr Lys Leu Ala Tyr Asp
         90   95   100

Ala Ala Gln Gly Ala Thr Pro Glu Ala Lys Tyr Asp Ala Tyr Val Ala
105   110   115   120

Thr Leu Ser Glu Ala Leu Arg Ile Ile Ala Gly Thr Leu Glu Val His
             125   130   135

Ala Val Lys Pro Ala Ala Glu Glu Val Lys Pro Ile Pro Ala Gly Glu
             140   145   150

Leu Gln Ile Val Asp Lys Ile Asp Val Ala Phe Arg Thr Ala Ala Thr
         155   160   165

Ala Ala Asn Ala Ala Pro Thr Asn Asp Lys Phe Thr Val Phe Glu Thr
170   175   180

Thr Phe Asn Lys Ala Ile Lys Glu Ser Thr Gly Gly Thr Tyr Glu Ser
185   190   195   200

Tyr Lys Phe Ile Pro Thr Leu Glu Ala Ala Val Lys Gln Ala Tyr Ala
             205   210   215

Ala Thr Val Ala Ser Ala Pro Glu Val Lys Tyr Ala Val Phe Glu Thr
             220   225   230

Ala Leu Lys Lys Ala Val Thr Ala Met Ser Glu Ala Gln Lys Glu Ala
             235   240   245

Lys Pro Ala Thr Ala Thr Pro Thr Pro Thr Ala Thr Ala Ala Ala Ala
     250   255   260

Val Ala Thr Asn Ala Ala Pro Val Ala Ala Gly Gly Tyr Lys Ile
265   270   275